

# IDAHO DEPARTMENT OF FISH AND GAME

**Jerry M. Conley, Director**

**SAWTOOTH HATCHERY**

**Annual Report**



**1 October 1983 - 30 September 1984**

by  
**Thomas L. Rogers**  
**Fish Hatchery Superintendent III**

**July 1985**

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## SAWTOOTH HATCHERY

### Annual Report

#### ABSTRACT

Construction began on the Sawtooth Hatchery in the spring of 1983. Sawtooth is part of the Lower Snake River Fish and Wildlife Compensation Plan. Its primary purpose will be to produce spring chinook salmon and steelhead. A satellite facility on the East Fork of the Salmon River was completed in the fall of 1983 to trap and hold spring chinook salmon and steelhead for spawning and production programs at Sawtooth, Magic Valley and Hagerman National hatcheries.

Spring chinook salmon were trapped and spawned at the Sawtooth site utilizing a temporary weir and trap. Hatchery personnel collected a total of 406 chinook salmon between July 7 and September 6, 1984 and took 601,671 green eggs. Two hundred and five adults were released upstream. The East Fork satellite trapped a total of 117 spring chinook salmon between June 20 and August 31, 1984. Sixty-five of these were released upstream, and 171,308 green eggs were taken. All chinook eggs were shipped to the Pahsimeroi Hatchery for hatching and early rearing while construction continued at Sawtooth.

Steelhead were also trapped at the East Fork site to test the facility and to take B-strain eggs for production at Hagerman National Hatchery. No steelhead were spawned due to the lack of B-run fish. A total of 40 steelhead were trapped and released to spawn naturally.

Tissue samples, slide smears and impressions were taken from salmon this year and checked for bacterial kidney disease to begin compiling a disease history on these fish. Viral samples were also taken during the course of the spawning season and sent in for analysis. Eggs were water-hardened in erythromycin and Argentyne to control disease transmission.

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## **OBJECTIVES**

1. To trap, hold and spawn spring chinook salmon at both the Sawtooth and East Fork facilities for production at the Sawtooth Hatchery.
2. To collect approximately 750,000 spring chinook eggs to enhance future salmon returns to the upper Salmon River drainage.
3. To develop a disease history on salmon returning to Sawtooth Hatchery and the East Fork satellite facility.
4. To develop a good working knowledge of Sawtooth Hatchery and the East Fork satellite and report any operational difficulties that may be encountered due to design or construction problems.

## **INTRODUCTION**

The Sawtooth Hatchery is part of the Lower Snake River Compensation Plan (LSRCP) to compensate for losses of anadromous fish caused by the Lower Snake River dams. It is being constructed along the upper reaches of the Salmon River, five miles south of Stanley in Custer County, Idaho. This project also includes a satellite facility located 16 miles up the East Fork of the Salmon River, also in Custer County, Idaho. Both facilities were constructed by the Army Corps of Engineers and will be operated by the Idaho Department of Fish and Game under contract funding by the U.S. Fish and Wildlife Service.

The hatchery construction has fallen behind schedule and the main facility is now expected to be on line in the spring of 1985. When complete, Sawtooth will have the capacity to produce up to three million salmon smolts and will be utilized to collect steelhead eggs for the Hagerman and Magic Valley LSRCP hatcheries.

Sawtooth Hatchery personnel trapped and spawned spring chinook salmon at both the Sawtooth site and East Fork facility this year. All eggs were transported to the Pahsimeroi Hatchery for incubation, hatching and rearing until Sawtooth Hatchery is ready for fish production.

Due to the low run of B-strain steelhead up the East Fork of the Salmon River, no eggs were taken at the satellite facility this year. All 40 steelhead trapped at this facility were released to spawn naturally. One hundred steelhead were transported to the East Fork trap from the Pahsimeroi Hatchery to test the holding ponds and set back the spawning time of these fish. The colder water at this site successfully held back the spawning time, and the fish were in good shape when they were removed from the facility.

## TECHNIQUES USED

### Sawtooth Salmon Trap

A temporary fish weir and trap were installed at the Sawtooth Hatchery site on July 7 and operated through September 6, 1984. All chinook that entered the trap were counted and sexed before being released into the holding pond. Beginning on August 9, approximately one-third of the chinook trapped were measured and released upstream of the weir to spawn naturally (Table 1).

Beginning on August 6, the salmon were sorted, checked for ripeness and spawned biweekly. All eggs were then packed on ice in coolers and transported to the Pahsimeroi Hatchery for incubation, hatching and early rearing.

### East Fork Salmon Trap

The East Fork satellite was put into operation on March 7 and was kept in operation through August 31, 1984. All steelhead that entered the trap were measured and released to spawn naturally. The salmon trapping began on June 20 and was taken out of operation on August 31, 1984. All fish were measured and sexed upon removal from the trap and were placed in the holding ponds. Beginning on August 7, approximately one-third of the run was released to spawn naturally (Table 2).

Starting on August 7, the salmon were sorted, checked for ripeness and spawned biweekly. All eggs were then packed on ice in coolers and transported to the Pahsimeroi Hatchery for incubation, hatching and early rearing.

### Disease Control and History

Spring chinook were sampled and checked for BKD bacteria and lesions. Fluorescent antibody slides were also taken and sent to the Hagerman Disease Lab to be checked for the presence of BKD bacteria. A random sample of fish were checked for virus by taking small portions of the kidney, spleen and pyloric caecae. Ovarian fluid was also randomly sampled for virus. The viral samples were sent to the Rangens Disease lab for analysis (Tables 3 and 4).

### Water-Hardening Eggs

All chinook eggs were water-hardened in erythromycin at a concentration of 2 ppm for one hour. Two groups of eggs were water-hardened with various concentrations of Argentyne to check the eye-up percentages of Argentyne water-hardened eggs and the effectiveness of this iodophore against BKD transmission. These groups were checked for BKD as fry using the fluorescent antibody technique.

Table 1. Sawtooth Hatchery summary of spring chinook released - 1984.

Date	Males	Females
August		
9	31	33
13	1	1
20	2	2
27	22	11
30	73	8
31	3	2
September		
2	1	1
3	4	5
5	3	2
Totals	140	65
Total Released = 205		



Table 2. East Fork satellite summary of spring chinook released - 1984.

Date		Males	Females
August			
	7	10	5
	31	48	2
	Total	58	7
Total	released - 65		

Table 3. Injury and disease summary at Sawtooth Hatchery.

**Injuries**

Gill net marks - 10 fish  
Nitrogen blisters - 33 fish  
Other injuries - 14 fish

**BKD lesions**

In morts - 41 total morts, 14 with BKD lesions (34%).  
In spawners - 145 total spawners, 22 with BKD lesions (15%).

**BKD in fluorescent Antibody Slides**

In morts - 41 total morts, 22 positive on FA (53.7%).  
In spawners - 145 total spawners, 78 positive on FA (53.8%).

Of the 186 fish checked on FA slides, 100 were positive for the presence of BKD or 53.8%. Chinook with BKD lesions were checked against FA slides. 12 were found to have lesions with a negative FA result.

**Virus**

All viral samples returned negative for IPN and IHN.

Ovarian fluid FA slides

7 samples (3 fish per sample) - all negative for BKD.

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Table 4. Injury and disease summary at East Fork satellite.

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**Injuries**

Gill net marks - 2 fish  
Nitrogen blisters - 23 fish  
Other injuries - 20 fish

**BKD Lesions**

In morts - 12 total morts, 4 with BKD lesions (33.3%).  
In spawners - 32 total spawners, 16 with BKD lesions (50%).

**BKD in fluorescent antibody slides**

In morts - 12 total morts, 10 positive on FA (83.3%).  
In spawners - 32 total spawners, 20 positive on FA (62.5%).

Of the 44 fish checked on FA slides, 30 were positive for the presence of BKD or 68.2%.

**Ovarian fluid FA slides**

5 samples (3 fish per sample) - 1 positive for BKD or 20%.

**Virus**

All viral samples returned negative for IPN and IHN.

---

## Hatchery Construction

During hatchery construction, a photographic slide file was established to record the location of buried structures for future reference. A working knowledge of the hatchery operation is being formed as the construction enters the final stages. Dialogue between the operator and constructors, designers and engineers have helped clarify hatchery functions, operations and future needs of the project.

## **FINDINGS**

### Trapping

The Sawtooth trap and weir were installed on July 7 and taken out of operation September 6, 1984. A total of 406 salmon (142 males, 187 females and 76 jacks) were trapped. Two-hundred and five, including 140 males and 65 females, were released for natural spawning above the weir (Table 5).

For Sawtooth Hatchery spring chinook length frequencies see Table 6.

The East Fork facility trapped 117 salmon from June 20 through August 31, 1984. Of this total, 54 were males, 41 were females and 22 were classified as jacks. Sixty-five of these, including 58 males and seven females, were released for natural spawning (Table 7).

For East Fork satellite spring chinook trap counts see Table 8.

The East Fork also trapped steelhead from March 7 through the first of June. A total of 40 steelhead (18 females and 22 males) were counted through and released to spawn naturally. Only two steelhead were classified as B-run fish and the only female had spawned before she reached the trap.

### Prespawning Mortality

Sawtooth Hatchery trapped 406 spring chinook salmon. Of these, 36 (8.9%) died prior to spawning. Eleven of these were males and 25 were females. Prespawning mortality causes included: fungus-6 fish, BKD-10 fish, nitrogen damage-8 fish and necrotic gills-12 fish (Table 9).

The East Fork satellite trapped 117 spring chinook. Prespawning mortality (3.4%) included one male and three females. Prespawning mortality was due to: fungus-1 fish, BKD-1 fish, nitrogen damage-1 fish, and necrotic gills-1 fish (Table 10).

### Spawning

Spawning operations began on August 6 and continued through August 30, 1984. Sawtooth Hatchery spawned 100 females for a total egg take of 601,671 green eggs or 6,016 eggs per female (Table 11).

Table 5. Sawtooth Hatchery spring chinook trap count - 1984.

Date	Males	Females	Jacks	Adipose clips (jacks)	Daily total	Running total
Jul						
11	6				6	6
12	7	1	1		9	15
13	6	3			9	24
14	2	3	1		6	30
15	3	6	2		11	41
16	2	3	3		8	49
17	2	6			8	57
18	2	8			10	67
19	6	10	4		20	87
20	2	4			6	93
21		3			3	96
22	4	4	1		9	105
23	5	8	2		15	120
24	10	5	7		22	142
25	4	6	2		12	154
26	5	6	3		14	168
27	5	7			12	180
28	4	7	3		14	194
29	1	7			8	202
30	3	5	3		11	213
31	2	7	4	2	13	226
August						
1	2	5	5		12	238
2	3		1		4	242
3	1	1	2		4	246
4	2	2	1		5	251
5	1	2			3	254
6	1	3	1		5	259
7	1	2			3	262
8		1			1	263
9	1	2			3	266
10		1			1	267
11	2	3	1		6	273
12		1			1	274
13		3			3	277
14	3				3	280
15	2	1			3	283
16					0	283
17	4	1			5	288
18	3	3	3	1	9	297
19		3			3	300
20	2	1			3	303

Table 5. Continued.

Date	Males	Females	Jacks	Adipose clips (lacks)	Daily total	Running total
August						
21		4			4	307
22	2	3	2		7	314
23	9	4	1		14	328
24	4	1	2		7	335
25	4	8	6		18	353
26	4	5	4	1	13	366
27		1	1		2	368
28	2	3	1		6	374
29	4	2			6	380
30	1	3	4		8	388
31	1	3	3		7	395
September						
1					0	395
2	1	1			2	397
3		4	2		6	403
4					0	403
5	2	1			3	406
6	Fish trap taken out of operation.					
Totals	143	187	76	111/	406	

1/Snouts removed and sent in for dissection of coded-wire tags.

Table 6. Sawtooth Hatchery spring chinook length frequency - 1984.

Total length (inches)	No. trapped
17	1
18	5
19	7
20	12
21	10
22	11
23	10
24	3
25	2
26	6
27	3
28	6
29	7
30	9
31	9
32	5
33	4
34	9
35	7
36	28
37	37
38	50
39	44
40	34
41	21
42	22
43	14
44	8
45	6
46	1
49	1
Total fish measured	392
Jacks which escaped	14
Total fish trapped	406

Table 7. East Fork satellite spring chinook trap count - 1984.

Date	Males	Females	Jacks	Daily total	Running total
June					
20		1		1	1
July					
13		1		1	2
14			1	1	3
15				0	3
16	4	1		5	8
17	1	4		5	13
18	3	3	1	7	20
19		2	1	3	23
20	1	1		2	25
21	2	2		4	29
22		1	2	3	32
23	2	2	1	5	37
24	1	1	1	3	40
25	1		1	2	42
26	1		1	2	44
27	4	1		5	49
28		1		1	50
29	1	1		2	52
30	1	1		2	54
31				0	54
August					
1			2	2	56
2	1	1		2	58
3			1	2	60
4	2		1	3	63
5			1	1	64
6	1			1	65
7	2	1		3	68
8		1		1	69
9	1	2		3	72
10				0	72
11	2			2	74
12		1		1	75
13	2			2	77
14		2		2	79
15	1			1	80
16	2		1	3	83
17	2	1		3	86
18	2	1	3	6	92
19	1	1		2	94
20	1			1	95
21	2	1		3	98
22	1	2		3	101



Table 7. Continued.

Date	Males	Females	Jacks	Daily total	Running total,
August					
23				1	102
24	1			1	103
25				0	103
26	1			2	105
27	1			2	107
28				1	108
29	1		1	2	110
30	4			4	114
31	1		2	3	117
Totals	54	41	22	117	

Table 8. East Fork satellite spring chinook length frequency - 1984.

Total length (inches)	No. trapped
16	3
17	0
18	7
19	3
20	8
21	1
22	3
23	4
24	0
25	1
26	4
27	3
28	5
29	1
30	3
31	2
32	3
33	0
34	0
35	0
36	5
37	10
38	12
39	8
40	8
41	8
42	11
43	1
44	2
45	1
Total fish	117

Table 9. Sawtooth Hatchery summary of adult spring chinook mortality - 1984.

Number of spring chinook trapped - 406

Prespawning mortality - 36 (8.9%) 11 males and 25 females

Probable prespawning mortality causes:

Fungus - 6 fish (16.7%)(percentage of total prespawning mortality)

BKD - 10 fish (27.8%)

Nitrogen damage - 8 fish (22.2%)

Necrotic gills - 12 fish (33.3%)

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Table 10. East Fork satellite summary of adult spring chinook mortality - 1984.

Number of chinook trapped - 117

Prespawning mortality - 4 (3.4%), 1 male and 3 females

Probable prespawning mortality causes:

Fungus - 1 fish (25%) (percentage of total prespawning mortality)

BKD - 1 fish (25%)

Nitrogen damage - 1 fish (25%)

Necrotic gills - 1 fish (25%)

---

Table 11. Sawtooth Hatchery spring chinook spawning summary - 1984.

Date	Females spawned	No. eqqs taken*	Total eggs to date*
August			
6	4	18,822	18,822
9	4	19,244	38,066
13	4	17,453	55,519
16	7	38,189	93,708
20	21	125,278	218,986
23	17	93,888	312,874
27	31	221,411	534,285
30	12	67,386	601,671
*volumetric measurement (Von Bayer measurement totals came to 550,146 green eggs).			

At the East Fork, spawning began on August 7 and continued through August 31, 1984. We spawned 25 females for a total egg take of 171,308 green eggs or 6,852 eggs per female (Table 12).

### **Eggs**

A total of 772,979 green eggs were shipped to the Pahsimeroi Hatchery for incubation, hatching and early rearing from both the Sawtooth site and East Fork facility. Eye-up success was 80% for Sawtooth and 93% for the East Fork, leaving a total of 640,580 eyed eggs at the Pahsimeroi Hatchery.

### **Carcass Disposition**

Salmon carcasses were disposed of as follows: 139 were given to the public, 48 were given to the Shoshone-Bannock Indians, 1 was given to the local Conservation Officer for bear bait, and 65 were buried on site. All other fish were released back to the Salmon River.

### **Disease History and Control**

All chinook mortalities and spawners were necropsied and checked for fungus, BKD lesions and injuries. A fluorescent antibody slide was taken from all mortalities and later checked for the presence of kidney disease bacteria. Twelve samples of ovarian fluid were also checked for BKD bacteria through FAT slides. The results of these tests are found on the disease summary (Table 3).

Production lots of eggs were water-hardened in erythromycin at a concentration of 2 ppm for 1 hour. In addition, two groups of eggs were water-hardened in erythromycin at a concentration of 2 ppm for one hour. In addition, two groups of eggs were water-hardened with various concentrations of iodine using Argentyne. Erythromycin used at a concentration of 2 ppm was used as a control in the Argentyne tests. Prior to water-hardening, eggs were pooled to eliminate bias. The results of the group spawned on August 13 were as follows: 2 ppm erythromycin (control)-98% eye-up, 50 ppm Argentyne-97% eye-up, and 10,000 ppm Argentyne-99% eye-up. The results of the second group of eggs, spawned on August 20, were as follows: 2 ppm erythromycin (control)-79% eye-up, 50 ppm Argentyne-85% eye-up, 75 ppm Argentyne-78% eye-up, and 100 ppm Argentyne-86% eye-up. After hatching, both groups were checked for BKD on fluorescent antibody slides. These tests yielded inconclusive data; very few bacteria seen in any of the test groups. Argentyne water-hardening had no negative effect on percentage of eye-up in either of the lots tested.

### **Sawtooth Hatchery Construction**

The Sawtooth Hatchery construction schedule has fallen about 3 months behind schedule, and we are now expecting to move fish on the

Table 12. East Fork satellite spring chinook spawning summary - 1984.

Date	Females spawned	No. eggs taken*	Total eggs to date*
7	4	22,971	22,971
10	3	17,597	40,568
14	5	39,772	80,340
17	3	18,260	98,600
21	5	41,457	140,057
24	2	13,967	154,024
28	3	17,284	171,308

\*Volumetric measurement (Von Bayer measurement totals came to 156,582 green eggs).

station in the spring of 1985.

Landscaping and some outside work has been put off until the weather moderates in 1985. Finish work on the buildings will continue through this winter along with electrical and plumbing hook-ups. The visitors center and displays are scheduled to be finished in June of 1985. Overall, the construction stands at about 96% complete at the end of 1984.

#### **RECOMMENDATIONS**

It is recommended that a research program on the control of bacterial kidney disease be initiated in 1985. The effect of injecting adult salmon with erythromycin on adult salmon returns at both Sawtooth and the East Fork facilities should be tested. The study on water-hardening eggs in the iodophore Argentyne should be continued.

Fish nutrition and feeding methods will be addressed as Sawtooth goes into fish production. Various diets, along with feeding frequency, percent body weight fed and growth rates, will need to be monitored.

Training programs for both permanent and temporary personnel will be undertaken this coming year and will cover operational aspects of the hatchery, safety programs, maintenance of equipment, personnel management, public relations, disease control and Fish and Game policies.

#### **ACKNOWLEDGEMENTS**

I wish to thank those who assisted in the installation of the temporary weir and trap at Sawtooth: Bob Stenerson, Ralph Hutchinson, Fred Partridge, Wayne Wakkinen and Gary Gadwa.

Thanks also to Idaho Power Company and the Pahsimeroi Hatchery personnel for their assistance during the spawning season and early rearing of the Sawtooth salmon.

Hatchery staffing during the year included: Thomas L. Rogers, Fish Hatchery Superintendent III; Leni Oman, Arnie Miller, Todd Bare, Biological Aides; and Lil Sherwood, James Charlton, Ross Hamilton, YCC program.